

# SEQUENCE LISTING

<110> Davydova, Elena K.  
 Rothman-Denes, Lucia B.  
 Dahl, Gary A.  
~~Meic, Judith E.~~  
 Gerdes, Svetlana Y.  
 Jendrisak, Jerome J.

<120> PREPARATION AND USE OF SINGLE-STRANDED TRANSCRIPTION SUBSTRATES  
 FOR SYNTHESIS OF TRANSCRIPTION PRODUCTS CORRESPONDING TO TARGET  
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<170> PatentIn Ver. 2.1

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 Phe Gly Ser Ala Gly Val Val Gln Ala Pro Ala Gly Ala Ala Arg Leu  
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 Ala Gly Ala Ala Thr Ala Pro Val Leu Arg Thr Thr Met Ala Gly Val

450					455					460					
Lys	Ala	Ala	Gly	Ser	Val	Ala	Gly	Lys	Val	Val	Ser	Pro	Ile	Lys	Asn
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Thr	Leu	Val	Ala	Arg	Gly	Glu	Arg	Val	Met	Lys	Gln	Asn	Glu	Glu	Ala
				485					490						495
Ser	Pro	Val	Ala	Asp	Asp	Tyr	Val	Ala	Gln	Ala	Ala	Gln	Glu	Ala	Met
			500					505					510		
Ala	Gln	Ala	Pro	Glu	Ala	Glu	Val	Thr	Ile	Arg	Asp	Ala	Val	Glu	Ala
		515					520					525			
Thr	Asp	Ala	Thr	Pro	Glu	Gln	Lys	Val	Ala	Ala	His	Gln	Tyr	Val	Ser
	530					535					540				
Asp	Leu	Met	Asn	Ala	Thr	Arg	Phe	Asn	Pro	Glu	Asn	Tyr	Gln	Glu	Ala
545					550					555					560
Pro	Glu	His	Ile	Arg	Asn	Ala	Val	Ala	Gly	Ser	Thr	Asp	Gln	Val	Gln
				565					570					575	
Val	Ile	Gln	Lys	Leu	Ala	Asp	Leu	Val	Asn	Thr	Leu	Asp	Glu	Ser	Asn
			580					585					590		
Pro	Gln	Ala	Leu	Met	Glu	Ala	Ala	Ser	Tyr	Met	Tyr	Asp	Ala	Val	Ser
		595					600					605			
Glu	Phe	Glu	Gln	Phe	Ile	Asn	Arg	Asp	Pro	Ala	Ala	Leu	Asp	Ser	Ile
	610					615					620				
Pro	Lys	Asp	Ser	Pro	Ala	Ile	Glu	Leu	Leu	Asn	Arg	Tyr	Thr	Asn	Leu
625					630					635					640
Thr	Ala	Asn	Ile	Gln	Asn	Thr	Pro	Lys	Val	Ile	Gly	Ala	Leu	Asn	Val
				645					650					655	
Ile	Asn	Arg	Met	Ile	Asn	Glu	Ser	Ala	Gln	Asn	Gly	Ser	Leu	Asn	Val
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Thr	Glu	Glu	Ser	Ser	Pro	Gln	Glu	Met	Gln	Asn	Val	Ala	Leu	Ala	Ala
		675					680					685			
Glu	Val	Ala	Pro	Glu	Lys	Leu	Asn	Pro	Glu	Ser	Val	Asn	Val	Val	Leu
	690					695					700				
Lys	His	Ala	Ala	Asp	Gly	Arg	Ile	Lys	Leu	Asn	Asn	Arg	Gln	Ile	Ala
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Ala	Leu	Gln	Asn	Ala	Ala	Ala	Ile	Leu	Lys	Gly	Ala	Arg	Glu	Tyr	Asp
			725						730					735	
Ala	Glu	Ala	Ala	Arg	Leu	Gly	Leu	Arg	Pro	Gln	Asp	Ile	Val	Ser	Lys
			740					745					750		
Gln	Ile	Lys	Thr	Asp	Glu	Ser	Arg	Thr	Gln	Glu	Gly	Gln	Tyr	Ser	Ala
		755					760						765		
Leu	Gln	His	Ala	Asn	Arg	Ile	Arg	Ser	Ala	Tyr	Asn	Ser	Gly	Asn	Phe
	770					775					780				

Glu	Leu	Ala	Ser	Ala	Tyr	Leu	Asn	Asp	Phe	Met	Gln	Phe	Ala	Gln	His	785	790	795	800
Met	Gln	Asn	Lys	Val	Gly	Ala	Leu	Asn	Glu	His	Leu	Val	Thr	Gly	Asn	805	810	815	
Ala	Asp	Lys	Asn	Lys	Ser	Val	His	Tyr	Gln	Ala	Leu	Thr	Ala	Asp	Arg	820	825	830	
Glu	Trp	Val	Arg	Ser	Arg	Thr	Gly	Leu	Gly	Val	Asn	Pro	Tyr	Asp	Thr	835	840	845	
Lys	Ser	Val	Lys	Phe	Ala	Gln	Gln	Val	Ala	Leu	Glu	Ala	Lys	Thr	Val	850	855	860	
Ala	Asp	Ile	Ala	Asn	Ala	Leu	Ala	Ser	Ala	Tyr	Pro	Glu	Leu	Lys	Val	865	870	875	880
Ser	His	Ile	Lys	Val	Thr	Pro	Leu	Asp	Ser	Arg	Leu	Asn	Ala	Pro	Ala	885	890	895	
Ala	Glu	Val	Val	Lys	Ala	Phe	Arg	Gln	Gly	Asn	Arg	Asp	Val	Ala	Ser	900	905	910	
Ser	Gln	Pro	Lys	Ala	Asp	Ser	Val	Asn	Gln	Val	Lys	Glu	Thr	Pro	Val	915	920	925	
Thr	Lys	Gln	Glu	Pro	Val	Thr	Ser	Thr	Val	Gln	Thr	Lys	Thr	Pro	Val	930	935	940	
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Ala	Ile	Lys	Glu	Pro	Val	Asn	Gln	Ser	Glu	Lys	Gln	Asp	Val	Asn	Leu	965	970	975	
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Glu	Thr	Ser	Thr	Lys	Glu	Ser	Thr	Val	Thr	Glu	Glu	Leu	Lys	Glu	Gly	995	1000	1005	
Ile	Asp	Ala	Val	Tyr	Pro	Ser	Leu	Val	Gly	Thr	Ala	Asp	Ser	Lys	Ala	1010	1015	1020	
Glu	Gly	Ile	Lys	Asn	Tyr	Phe	Lys	Leu	Ser	Phe	Thr	Leu	Pro	Glu	Glu	1025	1030	1035	1040
Gln	Lys	Ser	Arg	Thr	Val	Gly	Ser	Glu	Ala	Pro	Leu	Lys	Asp	Val	Ala	1045	1050	1055	
Gln	Ala	Leu	Ser	Ser	Arg	Ala	Arg	Tyr	Glu	Leu	Phe	Thr	Glu	Lys	Glu	1060	1065	1070	
Thr	Ala	Asn	Pro	Ala	Phe	Asn	Gly	Glu	Val	Ile	Lys	Arg	Tyr	Lys	Glu	1075	1080	1085	
Leu	Met	Glu	His	Gly	Glu	Gly	Ile	Ala	Asp	Ile	Leu	Arg	Ser	Arg	Leu	1090	1095	1100	

Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly  
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 Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu  
 1125 1130 1135  
 Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala  
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 Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala  
 1155 1160 1165  
 Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala  
 1170 1175 1180  
 Leu Leu Pro Glu Gly Leu Val Glu Gln Phe Asp Thr Gly Met Thr Leu  
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 Thr Glu Ala Val Ser Ser Leu Ala Gln Lys Ile Glu Ser Tyr Trp Gly  
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 Leu Ser Arg Asn Pro Asn Ala Pro Leu Gly Tyr Thr Lys Gly Ile Pro  
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 Thr Ala Met Ala Ala Glu Ile Leu Ala Ala Phe Val Glu Ser Thr Asp  
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 Val Val Glu Asn Ile Val Asp Met Ser Glu Ile Asp Pro Asp Asn Lys  
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 Lys Thr Ile Gly Leu Tyr Thr Ile Thr Glu Leu Asp Ser Phe Asp Pro  
 1265 1270 1275 1280  
 Ile Asn Ser Phe Pro Thr Ala Ile Glu Glu Ala Val Leu Val Asn Pro  
 1285 1290 1295  
 Thr Glu Lys Met Phe Phe Gly Asp Asp Ile Pro Pro Val Ala Asn Thr  
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 Gln Leu Arg Asn Pro Ala Val Arg Asn Thr Pro Glu Gln Lys Ala Ala  
 1315 1320 1325  
 Leu Lys Ala Glu Gln Ala Thr Glu Phe Tyr Val His Thr Pro Met Val  
 1330 1335 1340  
 Gln Phe Tyr Glu Thr Leu Gly Lys Asp Arg Ile Leu Glu Leu Met Gly  
 1345 1350 1355 1360  
 Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser  
 1365 1370 1375  
 Leu Glu Gly Lys Asn Arg Ser Val Glu Asp Ser Tyr Asn Gln Leu Phe  
 1380 1385 1390  
 Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val  
 1395 1400 1405  
 Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met  
 1410 1415 1420  
 Leu Gly Lys Tyr Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile



1425	1430	1435	1440
Leu Pro Thr Lys Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp	1445	1450	1455
Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val	1460	1465	1470
His Thr Met Thr Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu	1475	1480	1485
Glu Gly Asn Leu Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr	1490	1495	1500
Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu	1505	1510	1515
Gly Asp Arg Lys Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser	1525	1530	1535
Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr	1540	1545	1550
Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu	1555	1560	1565
Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys	1570	1575	1580
Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg	1585	1590	1595
Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu	1605	1610	1615
Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro	1620	1625	1630
Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu	1635	1640	1645
Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly	1650	1655	1660
Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Tyr Gly Ser Gly Ala Arg	1665	1670	1675
Gly Ile Ala Gly Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu	1685	1690	1695
Arg Met Ser Asp Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser	1700	1705	1710
Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala	1715	1720	1725
Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser	1730	1735	1740
Thr Val Pro Val Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly	1745	1750	1755
			1760

Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr Tyr Thr Ile Lys Gly  
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 Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr  
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 Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile Gln Ser Val Val Leu  
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 Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala  
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 Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu  
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 Asn Asp Ile Gln Ala Ser Leu Asn Asn Leu Ala Pro Met Ile Glu Thr  
 1860 1865 1870  
 Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala  
 1875 1880 1885  
 Asn Gln Val Leu Ala Thr Asn Leu Asp Asp Arg Met Arg Val Pro Met  
 1890 1895 1900  
 Ser Ile Tyr Ala Pro Ala Gln Ala Gly Val Ala Gly Ile Pro Phe Met  
 1905 1910 1915 1920  
 Thr Ile Gly Thr Gly Asp Gly Met Met Met Gln Thr Leu Ser Thr Met  
 1925 1930 1935  
 Lys Gly Ala Pro Lys Asn Thr Leu Lys Ile Phe Asp Gly Met Asn Ile  
 1940 1945 1950  
 Gly Leu Asn Asp Ile Thr Asp Ala Ser Arg Lys Ala Asn Glu Ala Val  
 1955 1960 1965  
 Tyr Thr Ser Trp Gln Gly Asn Pro Ile Lys Asn Val Tyr Glu Ser Tyr  
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 Ala Lys Phe Met Lys Asn Val Asp Phe Ser Lys Leu Ser Pro Glu Ala  
 1985 1990 1995 2000  
 Leu Glu Ala Ile Gly Lys Ser Ala Leu Glu Tyr Asp Gln Arg Glu Asn  
 2005 2010 2015  
 Ala Thr Val Asp Asp Ile Ala Asn Ala Ala Ser Leu Ile Glu Arg Asn  
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 Lys Val Asn Leu Ser Ile Asp Gln Met Ala Ala Val Gly Ala Pro Tyr  
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 Gln Asn Asn Gly Lys Ile Asp Leu Ser Asn Met Thr Pro Glu Gln Gln  
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Ala Asp Glu Leu Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys  
 2085 2090 2095  
 Gln Lys Val Ala Lys Ala Arg Ala Glu Val Lys Glu Glu Thr Val Ser  
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 Glu Lys Glu Pro Val Asn Pro Asp Phe Gly Met Val Gly Arg Glu His  
 2115 2120 2125  
 Lys Ala Ser Gly Val Arg Ile Leu Ser Ala Thr Ala Ile Arg Asn Leu  
 2130 2135 2140  
 Ala Lys Ile Ser Asn Leu Pro Ser Thr Gln Ala Ala Thr Leu Ala Glu  
 2145 2150 2155 2160  
 Ile Gln Lys Ser Leu Ala Ala Lys Asp Tyr Lys Ile Ile Tyr Gly Thr  
 2165 2170 2175  
 Pro Thr Gln Val Ala Glu Tyr Ala Arg Gln Lys Asn Val Thr Glu Leu  
 2180 2185 2190  
 Thr Ser Gln Glu Met Glu Glu Ala Gln Ala Gly Asn Ile Tyr Gly Trp  
 2195 2200 2205  
 Thr Asn Phe Asp Asp Lys Thr Ile Tyr Leu Val Ser Pro Ser Met Glu  
 2210 2215 2220  
 Thr Leu Ile His Glu Leu Val His Ala Ser Thr Phe Glu Glu Val Tyr  
 2225 2230 2235 2240  
 Ser Phe Tyr Gln Gly Asn Glu Val Ser Pro Thr Ser Lys Gln Ala Ile  
 2245 2250 2255  
 Glu Asn Leu Glu Gly Leu Met Glu Gln Phe Arg Ser Leu Asp Ile Ser  
 2260 2265 2270  
 Lys Asp Ser Pro Glu Met Arg Glu Ala Tyr Ala Asp Ala Ile Ala Thr  
 2275 2280 2285  
 Ile Glu Gly His Leu Ser Asn Gly Phe Val Asp Pro Ala Ile Ser Lys  
 2290 2295 2300  
 Ala Ala Ala Leu Asn Glu Phe Met Ala Trp Gly Leu Ala Asn Arg Ala  
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 Leu Ala Ala Lys Gln Lys Arg Thr Ser Ser Leu Val Gln Met Val Lys  
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 Asp Val Tyr Gln Ala Ile Lys Lys Leu Ile Trp Gly Arg Lys Gln Ala  
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 Pro Ala Leu Gly Glu Asp Met Phe Ser Asn Leu Leu Phe Asn Ser Ala  
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 Ser Ser Lys Lys Val Lys Asp Glu Ile Ser Thr Leu Glu Lys Glu Ile  
 2785 2790 2795 2800  
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 Arg Met Ser Ile Trp Pro Leu Ile Glu Ala Gly Glu Phe Ser Ser Ile  
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 Ile Ile Tyr Asp Asp Leu Val Lys Arg Lys Lys Lys Ser Ser Ser Glu

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                     3460                      3465                      3470  
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<211> 3318

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic  
Primer

<400> 3

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gctctgtctt ctcggtgctg ttatgaactc tttactgaga aagaaactgc taaccctgct 240
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gatggggata cctttaagta caacgaacaa ttgctacaga ctgctgtatt agcaggtctt 480
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<210> 4

<211> 1107

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic Peptide

<400> 4

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Tyr	Pro	Ser	Leu	Val	Gly	Thr	Ala	Asp	Ser	Lys	Ala	Glu	Gly	Ile	Lys
			20					25					30		

Asn	Tyr	Phe	Lys	Leu	Ser	Phe	Thr	Leu	Pro	Glu	Glu	Gln	Lys	Ser	Arg
		35					40					45			

Thr	Val	Gly	Ser	Glu	Ala	Pro	Leu	Lys	Asp	Val	Ala	Gln	Ala	Leu	Ser
	50					55					60				

Ser	Arg	Ala	Arg	Tyr	Glu	Leu	Phe	Thr	Glu	Lys	Glu	Thr	Ala	Asn	Pro
65					70					75				80	

Ala	Phe	Asn	Gly	Glu	Val	Ile	Lys	Arg	Tyr	Lys	Glu	Leu	Met	Glu	His
			85						90					95	

Gly	Glu	Gly	Ile	Ala	Asp	Ile	Leu	Arg	Ser	Arg	Leu	Ala	Lys	Phe	Leu
			100					105					110		





Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile Leu Pro Thr Lys  
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 Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp Phe Ser Ala Phe  
 450 455 460  
 Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val His Thr Met Thr  
 465 470 475 480  
 Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu Glu Gly Asn Leu  
 485 490 495  
 Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr Thr Gly Ser Leu  
 500 505 510  
 Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu Gly Asp Arg Lys  
 515 520 525  
 Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser Arg Tyr Leu Val  
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 Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr Val Glu Ala Asp  
 545 550 555 560  
 Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu Met Thr Gly Gly  
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 Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys Gly Gly Leu Phe  
 580 585 590  
 Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg Ser Thr Ala Asp  
 595 600 605  
 Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu Met Glu Ser Leu  
 610 615 620  
 Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro Ile Gln Ser Gln  
 625 630 635 640  
 Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu Pro Asp Ile Asn  
 645 650 655  
 Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly Ile Ala Lys Asn  
 660 665 670  
 Pro Leu Thr Ile Thr Ile Tyr Gly Ser Gly Ala Arg Gly Ile Ala Gly  
 675 680 685  
 Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu Arg Met Ser Asp  
 690 695 700  
 Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser Ala Ala Met Ala  
 705 710 715 720  
 Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala Glu Glu Leu Leu  
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 Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser Thr Val Pro Val  
 740 745 750  
 Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly Thr Gly Ala Lys

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Ala	Leu	Gln	Glu	Asn	Met	Leu	His	Phe	Phe	Val	Glu	Pro	Leu	Arg	Asn
785					790					795					800
Gly	Ile	Thr	Gln	Thr	Val	Gly	Glu	Ser	Leu	Val	Tyr	Ser	Thr	Glu	Gln
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Lys	Gln	Arg	Val	Gln	Glu	Lys	Leu	Ala	Glu	Lys	Ala	Lys	Asp	Pro	Thr
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Trp	Lys	Lys	Gly	Asp	Phe	Leu	Thr	Gln	Lys	Glu	Leu	Asn	Asp	Ile	Gln
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865					870					875					880
Phe	Tyr	Ile	Ala	Gly	Ser	Glu	Asn	Ala	Glu	Val	Ala	Asn	Gln	Val	Leu
				885					890					895	
Ala	Thr	Asn	Leu	Asp	Asp	Arg	Met	Arg	Val	Pro	Met	Ser	Ile	Tyr	Ala
			900					905					910		
Pro	Ala	Gln	Ala	Gly	Val	Ala	Gly	Ile	Pro	Phe	Met	Thr	Ile	Gly	Thr
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Gly	Asp	Gly	Met	Met	Met	Gln	Thr	Leu	Ser	Thr	Met	Lys	Gly	Ala	Pro
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Lys	Asn	Thr	Leu	Lys	Ile	Phe	Asp	Gly	Met	Asn	Ile	Gly	Leu	Asn	Asp
945					950					955					960
Ile	Thr	Asp	Ala	Ser	Arg	Lys	Ala	Asn	Glu	Ala	Val	Tyr	Thr	Ser	Trp
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Gln	Gly	Asn	Pro	Ile	Lys	Asn	Val	Tyr	Glu	Ser	Tyr	Ala	Lys	Phe	Met
			980					985					990		
Lys	Asn	Val	Asp	Phe	Ser	Lys	Leu	Ser	Pro	Glu	Ala	Leu	Glu	Ala	Ile
		995					1000					1005			
Gly	Lys	Ser	Ala	Leu	Glu	Tyr	Asp	Gln	Arg	Glu	Asn	Ala	Thr	Val	Asp
	1010					1015					1020				
Asp	Ile	Ala	Asn	Ala	Ala	Ser	Leu	Ile	Glu	Arg	Asn	Leu	Arg	Asn	Ile
1025					1030					1035					1040
Ala	Leu	Gly	Val	Asp	Ile	Arg	His	Lys	Val	Leu	Asp	Lys	Val	Asn	Leu
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Ser	Ile	Asp	Gln	Met	Ala	Ala	Val	Gly	Ala	Pro	Tyr	Gln	Asn	Asn	Gly
			1060					1065					1070		
Lys	Ile	Asp	Leu	Ser	Asn	Met	Thr	Pro	Glu	Gln	Gln	Ala	Asp	Glu	Leu
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Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys Gln Lys Val Ala  
 1090 1095 1100

Lys Ala Arg  
 1105

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 <211> 3432  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic  
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<210> 6

<211> 1143

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic Peptide

<400> 6

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      20                      25                      30

Pro Ser Ser Arg Ser Glu Ser Thr Val Thr Glu Glu Leu Lys Glu Gly
      35                      40                      45

Ile Asp Ala Val Tyr Pro Ser Leu Val Gly Thr Ala Asp Ser Lys Ala
      50                      55                      60

Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu
      65                      70                      75                      80

Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala
      85                      90                      95

Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu
      100                      105                      110

Thr Ala Asn Pro Ala Phe Asn Gly Glu Val Ile Lys Arg Tyr Lys Glu
      115                      120                      125

Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu
      130                      135                      140

Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly
      145                      150                      155                      160

Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu
      165                      170                      175

Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala

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Thr	Glu	Ala	Val	Ser	Ser	Leu	Ala	Gln	Lys	Ile	Glu	Ser	Tyr	Trp	Gly
				245					250					255	
Leu	Ser	Arg	Asn	Pro	Asn	Ala	Pro	Leu	Gly	Tyr	Thr	Lys	Gly	Ile	Pro
			260					265					270		
Thr	Ala	Met	Ala	Ala	Glu	Ile	Leu	Ala	Ala	Phe	Val	Glu	Ser	Thr	Asp
		275					280					285			
Val	Val	Glu	Asn	Ile	Val	Asp	Met	Ser	Glu	Ile	Asp	Pro	Asp	Asn	Lys
	290					295					300				
Lys	Thr	Ile	Gly	Leu	Tyr	Thr	Ile	Thr	Glu	Leu	Asp	Ser	Phe	Asp	Pro
305					310					315					320
Ile	Asn	Ser	Phe	Pro	Thr	Ala	Ile	Glu	Glu	Ala	Val	Leu	Val	Asn	Pro
				325					330					335	
Thr	Glu	Lys	Met	Phe	Phe	Gly	Asp	Asp	Ile	Pro	Pro	Val	Ala	Asn	Thr
			340					345					350		
Gln	Leu	Arg	Asn	Pro	Ala	Val	Arg	Asn	Thr	Pro	Glu	Gln	Lys	Ala	Ala
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Leu	Lys	Ala	Glu	Gln	Ala	Thr	Glu	Phe	Tyr	Val	His	Thr	Pro	Met	Val
	370					375					380				
Gln	Phe	Tyr	Glu	Thr	Leu	Gly	Lys	Asp	Arg	Ile	Leu	Glu	Leu	Met	Gly
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Ala	Gly	Thr	Leu	Asn	Lys	Glu	Leu	Leu	Asn	Asp	Asn	His	Ala	Lys	Ser
				405					410					415	
Leu	Glu	Gly	Lys	Asn	Arg	Ser	Val	Glu	Asp	Ser	Tyr	Asn	Gln	Leu	Phe
			420					425					430		
Ser	Val	Ile	Glu	Gln	Val	Arg	Ala	Gln	Ser	Glu	Asp	Ile	Ser	Thr	Val
			435				440					445			
Pro	Ile	His	Tyr	Ala	Tyr	Asn	Met	Thr	Arg	Val	Gly	Arg	Met	Gln	Met
	450					455					460				
Leu	Gly	Lys	Tyr	Asn	Pro	Gln	Ser	Ala	Lys	Leu	Val	Arg	Glu	Ala	Ile
465					470					475					480
Leu	Pro	Thr	Lys	Ala	Thr	Leu	Asp	Leu	Ser	Asn	Gln	Asn	Asn	Glu	Asp
				485					490					495	
Phe	Ser	Ala	Phe	Gln	Leu	Gly	Leu	Ala	Gln	Ala	Leu	Asp	Ile	Lys	Val
			500				505						510		

His	Thr	Met	Thr	Arg	Glu	Val	Met	Ser	Asp	Glu	Leu	Thr	Lys	Leu	Leu	515	520	525
Glu	Gly	Asn	Leu	Lys	Pro	Ala	Ile	Asp	Met	Met	Val	Glu	Phe	Asn	Thr	530	535	540
Thr	Gly	Ser	Leu	Pro	Glu	Asn	Ala	Val	Asp	Val	Leu	Asn	Thr	Ala	Leu	545	550	555
Gly	Asp	Arg	Lys	Ser	Phe	Val	Ala	Leu	Met	Ala	Leu	Met	Glu	Tyr	Ser	565	570	575
Arg	Tyr	Leu	Val	Ala	Glu	Asp	Lys	Ser	Ala	Phe	Val	Thr	Pro	Leu	Tyr	580	585	590
Val	Glu	Ala	Asp	Gly	Val	Thr	Asn	Gly	Pro	Ile	Asn	Ala	Met	Met	Leu	595	600	605
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Gly	Gly	Leu	Phe	Ile	Gly	Ser	Pro	Asn	Lys	Thr	Met	Asn	Glu	His	Arg	625	630	635
Ser	Thr	Ala	Asp	Asn	Asn	Asp	Leu	Tyr	Gln	Ala	Ser	Thr	Asn	Ala	Leu	645	650	655
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Ile	Gln	Ser	Gln	Ile	Asp	Ser	Leu	Leu	Ser	Leu	Met	Asp	Leu	Phe	Leu	675	680	685
Pro	Asp	Ile	Asn	Leu	Gly	Glu	Asn	Gly	Ala	Leu	Glu	Leu	Lys	Arg	Gly	690	695	700
Ile	Ala	Lys	Asn	Pro	Leu	Thr	Ile	Thr	Ile	Tyr	Gly	Ser	Gly	Ala	Arg	705	710	715
Gly	Ile	Ala	Gly	Lys	Leu	Val	Ser	Ser	Val	Thr	Asp	Ala	Ile	Tyr	Glu	725	730	735
Arg	Met	Ser	Asp	Val	Leu	Lys	Ala	Arg	Ala	Lys	Asp	Pro	Asn	Ile	Ser	740	745	750
Ala	Ala	Met	Ala	Met	Phe	Gly	Lys	Gln	Ala	Ala	Ser	Glu	Ala	His	Ala	755	760	765
Glu	Glu	Leu	Leu	Ala	Arg	Phe	Leu	Lys	Asp	Met	Glu	Thr	Leu	Thr	Ser	770	775	780
Thr	Val	Pro	Val	Lys	Arg	Lys	Gly	Val	Leu	Glu	Leu	Gln	Ser	Thr	Gly	785	790	795
Thr	Gly	Ala	Lys	Gly	Lys	Ile	Asn	Pro	Lys	Thr	Tyr	Thr	Ile	Lys	Gly	805	810	815
Glu	Gln	Leu	Lys	Ala	Leu	Gln	Glu	Asn	Met	Leu	His	Phe	Phe	Val	Glu	820	825	830

Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr  
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 850 855 860  
 Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala  
 865 870 875 880  
 Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu  
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 Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala  
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<210> 7  
 <211> 3432  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic  
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<210> 8

<211> 1143

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic Peptide

<400> 8

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Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu
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Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala
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Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu
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Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu
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Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly
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Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu
      165             170             175

Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala
      180             185             190

Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala
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Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala
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 Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser  
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 420 425 430  
 Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val  
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 Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met  
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 485 490 495  
 Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val  
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 His Thr Met Thr Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu  
 515 520 525  
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 530 535 540  
 Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu

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Val	Glu	Ala	Asp	Gly	Val	Thr	Asn	Gly	Pro	Ile	Asn	Ala	Met	Met	Leu
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Ser	Thr	Ala	Asp	Asn	Asn	Asp	Leu	Tyr	Gln	Ala	Ser	Thr	Asn	Ala	Leu
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Thr	Val	Pro	Val	Lys	Arg	Lys	Gly	Val	Leu	Glu	Leu	Gln	Ser	Thr	Gly
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Thr	Gly	Ala	Lys	Gly	Lys	Ile	Asn	Pro	Lys	Thr	Tyr	Thr	Ile	Lys	Gly
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Glu	Gln	Leu	Lys	Ala	Leu	Gln	Glu	Asn	Met	Leu	His	Phe	Phe	Val	Glu
			820					825					830		
Pro	Leu	Arg	Asn	Gly	Ile	Thr	Gln	Thr	Val	Gly	Glu	Ser	Leu	Val	Tyr
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Ser	Thr	Glu	Gln	Leu	Gln	Lys	Ala	Thr	Gln	Ile	Gln	Ser	Val	Val	Leu
	850					855					860				
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865					870					875					880



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<213> Artificial Sequence

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<223> Description of Artificial Sequence: Synthetic  
Primer

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Primer

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<223> Description of Artificial Sequence: Synthetic  
Primer

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<210> 14  
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<223> Description of Artificial Sequence: Synthetic Peptide

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35 40 45

Asp Ser Val Thr Asn Ala Lys Gln Val Asp Val Ser Thr Ala Thr Ala  
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Gln Lys Lys Ala Glu Gln Gly Val Thr Thr Pro Leu Val Ser Pro Asp  
65 70 75 80

Ala Ala Tyr Gln Met Gln Ala Ala Arg Thr Gly Asn Val Gly Ala Asn  
85 90 95

Ala Phe Glu Pro Gly Thr Val Gln Ser Asp Phe Met Asn Leu Thr Pro  
100 105 110

Met Gln Ile Met Asn Lys Tyr Gly Val Glu Gln Gly Leu Gln Leu Ile  
115 120 125

Asn Ala Arg Ala Asp Ala Gly Asn Gln Val Phe Asn Asp Ser Val Thr  
130 135 140

Thr Arg Thr Pro Gly Glu Glu Leu Gly Asp Ile Ala Thr Gly Val Gly  
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Leu Gly Phe Val Asn Thr Leu Gly Gly Ile Gly Ala Leu Gly Ala Gly  
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Leu Leu Asn Asp Asp Ala Gly Ala Val Val Ala Gln Gln Leu Ser Lys  
180 185 190

Phe Asn Asp Ala Val His Ala Thr Gln Ser Gln Ala Leu Gln Asp Lys  
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Arg Lys Leu Phe Ala Ala Arg Asn Leu Met Asn Glu Val Glu Ser Glu  
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Arg Gln Tyr Gln Thr Asp Lys Lys Glu Gly Thr Asn Asp Ile Val Ala  
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 Lys Ala Val Val Pro Ala Asn Thr Leu Arg Ser Ala Ala Leu Ala Gly  
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1555 1560 1565  
Leu Met Glu Tyr Ser Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe  
1570 1575 1580  
Val Thr Pro Leu Tyr Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile  
1585 1590 1595 1600  
Asn Ala Met Met Leu Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile  
1605 1610 1615  
Arg Asn Ile Ala Lys Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr  
1620 1625 1630  
Met Asn Glu His Arg Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala  
1635 1640 1645  
Ser Thr Asn Ala Leu Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr  
1650 1655 1660  
Ala Ser Asn Met Pro Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu  
1665 1670 1675 1680  
Met Asp Leu Phe Leu Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu  
1685 1690 1695  
Glu Leu Lys Arg Gly Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Tyr  
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1730 1735 1740  
Asp Pro Asn Ile Ser Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala  
1745 1750 1755 1760  
Ser Glu Ala His Ala Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met  
1765 1770 1775  
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1780 1785 1790  
Leu Gln Ser Thr Gly Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr  
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Tyr Thr Ile Lys Gly Glu Gln Leu Lys Ala Leu Gln Glu Asn Met Leu  
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His Phe Phe Val Glu Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly  
1825 1830 1835 1840  
Glu Ser Leu Val Tyr Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile  
1845 1850 1855  
Gln Ser Val Val Leu Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys

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1875				1880				1885							
Thr	Gln	Lys	Glu	Leu	Asn	Asp	Ile	Gln	Ala	Ser	Leu	Asn	Asn	Leu	Ala
1890				1895				1900							
Pro	Met	Ile	Glu	Thr	Gly	Ser	Gln	Thr	Phe	Tyr	Ile	Ala	Gly	Ser	Glu
1905				1910				1915				1920			
Asn	Ala	Glu	Val	Ala	Asn	Gln	Val	Leu	Ala	Thr	Asn	Leu	Asp	Asp	Arg
1925				1930				1935							
Met	Arg	Val	Pro	Met	Ser	Ile	Tyr	Ala	Pro	Ala	Gln	Ala	Gly	Val	Ala
1940				1945				1950							
Gly	Ile	Pro	Phe	Met	Thr	Ile	Gly	Thr	Gly	Asp	Gly	Met	Met	Met	Gln
1955				1960				1965							
Thr	Leu	Ser	Thr	Met	Lys	Gly	Ala	Pro	Lys	Asn	Thr	Leu	Lys	Ile	Phe
1970				1975				1980							
Asp	Gly	Met	Asn	Ile	Gly	Leu	Asn	Asp	Ile	Thr	Asp	Ala	Ser	Arg	Lys
1985				1990				1995				2000			
Ala	Asn	Glu	Ala	Val	Tyr	Thr	Ser	Trp	Gln	Gly	Asn	Pro	Ile	Lys	Asn
2005				2010				2015							
Val	Tyr	Glu	Ser	Tyr	Ala	Lys	Phe	Met	Lys	Asn	Val	Asp	Phe	Ser	Lys
2020				2025				2030							
Leu	Ser	Pro	Glu	Ala	Leu	Glu	Ala	Ile	Gly	Lys	Ser	Ala	Leu	Glu	Tyr
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His	Lys	Val	Leu	Asp	Lys	Val	Asn	Leu	Ser	Ile	Asp	Gln	Met	Ala	Ala
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Thr	Pro	Glu	Gln	Gln	Ala	Asp	Glu	Leu	Asn	Lys	Leu	Phe	Arg	Glu	Glu
2115				2120				2125							
Leu	Glu	Ala	Arg	Lys	Gln	Lys	Val	Ala	Lys	Ala	Arg	Ala	Glu	Val	Lys
2130				2135				2140							
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 Asn Val Thr Glu Leu Thr Ser Gln Glu Met Glu Glu Ala Gln Ala Gly  
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 Asn Ile Tyr Gly Trp Thr Asn Phe Asp Asp Lys Thr Ile Tyr Leu Val  
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 Ser Pro Ser Met Glu Thr Leu Ile His Glu Leu Val His Ala Ser Thr  
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 Ser Lys Gln Ala Ile Glu Asn Leu Glu Gly Leu Met Glu Gln Phe Arg  
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Arg Ala Gln Glu Leu Tyr Thr His Val Met Lys His Leu Thr Val Glu  
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 His Phe Met Ala Asp Pro Asp Ser Thr Asn Pro Ala Asp Arg Tyr Tyr  
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 Asp Ala Lys Gly Arg Thr Ser Leu Leu Pro Thr Phe Leu Gly Leu Ala  
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 Lys Ala Asp Lys Lys Leu Gly Asn Asp Ile Asp Thr Leu Leu Thr Asn  
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 2770 2775 2780  
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Glu	Arg	Ile	Thr	Asn	Gly	Pro	Val	Ala	Asp	Val	Ala	Ala	Ile	Asp	Lys
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Ile	Ala	Tyr	Met	Val	Gly	Gln	Arg	Thr	Glu	Glu	Met	Arg	Lys	Ala	Lys
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Glu	Asn	Gln	Gln	Gly	Val	Asn	Leu	Ile	Ile	Ala	Asp	Asp	Lys	Glu	Phe
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Val	Ala	Gly	Arg	Ile	Thr	Asp	Lys	Pro	Thr	Val	Glu	Arg	Ile	Thr	Lys
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			3125					3130					3135		
Asp	Ser	Ser	Ala	Asn	Lys	Ser	Gln	Tyr	Val	Asn	Leu	Leu	Gly	Lys	Ile
			3140				3145						3150		
Asp	Asp	Pro	Val	Leu	Ala	Asp	Ala	Ile	Asn	Leu	Met	Asn	Ile	Glu	Thr
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 Asp Val Trp Thr Gly Asn Ser Arg Trp Ser Pro Ser Thr Leu Asp Thr  
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 Ser Arg Leu Arg Gln Ile Asp Ala Glu Ala Glu Leu Arg Ala Ala Glu  
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 Val Ala Glu Gly Lys Ile His Glu Tyr Met Glu Lys Leu Ala Asn Lys  
 3365 3370 3375  
 Leu Pro Glu Lys Val Arg Asn Ala Gly Arg Tyr Ala Leu Ile Ala Lys  
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 Asp Thr Ala Leu Phe Gln Gly Ile Gln Lys Thr Val Glu Tyr Ser Asp  
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 Tyr Asp Arg Leu Pro Gly Arg Phe Arg Gly Tyr Met Glu Ser Met Gly  
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 Leu Met Trp Phe Tyr Asn Phe Lys Ile Arg Ser Ile Lys Val Ala Met  
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Pro Ala Pro Thr Met Phe Gly Asn Val Gly Leu Pro Ile Gln Asp Asn  
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Met Leu Thr Met Leu Ala Glu Gly Arg Leu Asp Tyr Ser Leu Gly Phe  
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